What we claim is:

1. A surface mount electronic device comprising a connecting substrate having a bottom surface and a solid or semi-solid thermoplastic adhesive adhered to a portion of a said bottom surface.

2. The surface mount device of claim 1, wherein the thermoplastic adhesive is applied as a solid or semi-solid to an available surface on said bottom surface.

3. The surface mount device of claim 2, wherein the surface mounted electronic device is a ball grid array.

4. The surface mount device of claim 3, wherein the ball grid array is selected from the group consisting of μBGA, flip chip BGA, a flex tape BGA, and stacked die BGA.

5 The surface mount device of claim 2, wherein the surface mounted electronic device comprises an integrated circuit for flash memory, microprocessor, counter, or timer applications.

6. The surface mount device of claim 2, wherein the connecting substrate material comprises a polyimide, polyester, polycyclohexylene terephthalate, polyphenylene sulfides, or epoxy resin impregnated glass.

7. The surface mount device of claim 2, wherein said thermoplastic adhesive is adhered to an available surface on the connecting substrate.

8. The surface mount device of claim 7, wherein the surface mounted electronic device comprises a BGA having an array of solder bumps on said bottom surface of the connecting substrate, and the thermoplastic adhesive is applied as strips spanning the length of at least two perimeter edges on said bottom surface.

9. The surface mount device of claim 7, wherein the surface mounted electronic device comprises a BGA having an array of solder bumps on said bottom surface of the connecting substrate, and the thermoplastic adhesive is applied on each corner of the bottom surface.

10. The surface mount device of claim 7, wherein the surface mounted electronic device comprises a BGA having an array of solder bumps on said bottom surface of the connecting substrate, and the thermoplastic adhesive is applied as squares or rectangles between each of the four corners on the said bottom surface.

11. The surface mount device of claim 2, wherein the thermoplastic adhesive is attached to the connecting substrate by application of heat to the thermoplastic adhesive, the connecting substrate, or both, sufficient to render the thermoplastic adhesive tacky.

12. The surface mount device of claim 2, wherein the thermoplastic adhesive is adhered to the connecting substrate by application of heat to the thermoplastic adhesive, the connecting substrate, or both, laying down

the thermoplastic adhesive on an available surface of the connecting substrate, followed by the application of pressure to the thermoplastic adhesive.

13. The surface mount device of claim 2, wherein the thermoplastic adhesive is adhered to the connecting substrate by application of pressure on the thermoplastic adhesive.

14. The surface mount device of claim 13, wherein a pressure sensitive adhesive is applied to the thermoplastic adhesive prior to adhering the thermoplastic adhesive to the connecting substrate, and the thermoplastic adhesive is adhered to the connecting substrate through the pressure sensitive adhesive.

15. The surface mount device of claim 14, wherein at least 75% of the thermoplastic adhesive surface area is free of the pressure sensitive adhesive.

16. The surface mount device of claim 1, wherein the bottom surface of the connecting substrate has an array of solder bumps, and the thermoplastic adhesive has a height which is less than the solder bump height.

17. The surface mount device of claim 16, wherein the height of the thermoplastic adhesive is at least 25% and no more than 90% of the solder bump height.

18. The surface mount device of claim 17, wherein the height of the thermoplastic adhesive is 70% or less of the solder bump height.

19. The surface mount device of claim 16, wherein the height of the thermoplastic adhesive is at least 40% of the solder bump height.

20. The surface mount device of claim 1, wherein the thermoplastic adhesive has a complex viscosity of at least 50 Pa•s, and is a solid or semi-solid at 55°C.

21. The surface mount device of claim 20, wherein the thermoplastic adhesive has a complex viscosity of at least 80 Pa•s, and is a solid at 80°C.

22. The surface mount device of claim 21, wherein the thermoplastic adhesive is a solid or semi-solid at 100°C.

23. The surface mount device of claim 21, wherein the thermoplastic adhesive comprises a functionalized polyolefin.

24. The surface mount device of claim 23, wherein the amount of the functionalized polyolefin is at least 2 wt.%, based on the weight of the thermoplastic adhesive..

25. The surface mount device of claim 23, wherein the amount of the functionalized polyolefin is at least 20 wt.%, based on the weight of the thermoplastic adhesive.

26. The surface mount device of claim 23, wherein the amount of the functionalized polyolefin is at least 40 wt.%, based on the weight of the thermoplastic adhesive.

27. The surface mount device of claim 23, wherein the functionalized polyolefin is functionalized with acid groups, amine groups, or a combination thereof.

28. The surface mount device of claim 23, wherein the functionalized polyolefin is functionalized with a functionalizing agent comprising unsaturated mono- or polycarboxylic acid monomers or the acid derivatives thereof.

29. The surface mount device of claim of claim 28, wherein the functionalizing agent comprises acrylic acid, methacrylic acid, ethylacrylic acid, butylacrylic acid, maleic acid, fumaric acid, tetrahydrophthalic acid, 4-methylcyclohexane-4-en-1,2-dicarboxylic acid, bicyclo(2,2,1)hepta-5-en-2,3-dicarboxylic acid, itaconic acid, crotonic acid, citraconic acid, isocrotonic acid, mesaconic acid, angelic acid, maleic anhydride, crotonic anhydride, citraconic anhydride, itaconic anhydride, nadic anhydride, nadic methyl anhydride, tetrahydro phthalic anhydride, vinyl acetate, methyl hydrogen maleate, methyl acrylate, methyl methacrylate, ethyl acrylate, ethyl methacrylate, butyl acrylate, butyl methacrylate, glycidyl acrylate, glycidyl methacrylate, monoethyl maleate, diethyl maleate, monomethyl fumarate, dimethyl fumarate, monoethyl itaconate, diethyl itaconate, acrylamide, methacrylamide, maleic monoamide, maleic diamide, maleic N-monoethylamide, maleic N,N-diethylamide, maleic N-monobutylamide, maleic N,N-dibutylamide, fumaric amide, fumaric diamide, fumaric N-monoethylamide, fumaric N,N-diethylamide, fumaric N-monobutylamide, fumaric N,N-dibutylamide, maleimide, N-butylmaleimide, N-phenylmaleimide, sodium acrylate, mono and di-sodium maleate, sodium methacrylate, potassium acrylate, or potassium methacrylate, or combinations thereof.

30. The surface mount device of claim 29, wherein the functionalizing agent comprises itaconic acid, acrylic acid, methacrylic acid, ethylacrylic acid, butylacrylic acid, maleic acid, the ester and anhydride derivatives thereof, or vinyl acetate.

31. The surface mount device of claim 30, wherein the functionalizing agent comprises methacrylic acid, acrylic acid, maleic acid, or maleic anhydride.

32. The surface mount device of claim 27, wherein the amount of functionalizing agent ranges from 0.05 wt.% to 50 wt.%, based on the weight of the functionalized polyolefin.

33. The surface mount device of claim 23, wherein the functionalized polyolefin comprises a random copolymer of ethylene and an unsaturated carboxylic acid or derivative thereof.

34. The surface mount device of claim 33, wherein the acid or derivative thereof comprises methacrylic acid, acrylic acid, maleic acid, maleic anhydride or combinations thereof.

35. The surface mount device of claim 23, wherein the functionalized polyolefin has a density ranging from 0.915 to 0.935 g/cc.

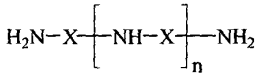
36. The surface mount device of claim 23, wherein the functionalized polyolefin is a copolymer or grafted polymer of one or more alpha olefin monomers having 2-10 carbon atoms and mono- or polyunsaturated carboxylic

acids or the derivatives thereof, and optionally carbon monoxide monomer.

37. The surface mount device of claim 23, wherein the functionalized polyolefin comprises an amine functionalized polyolefin..

38. The surface mount device of claim 37, wherein the amine functionalized polyolefin is prepared by reacting an acid functionalized polyolefin with a polyamine compound or by copolymerizing or reacting a polyamine compound with a polyolefin.

39. The surface mount device of claim 38, wherein the polyamine compound is represented by the formula:



wherein n is an average of integers within 0 and 10, inclusive, preferably within 0 and 4 inclusive; and X is a divalent branched or unbranched hydrocarbon radical having about 1-24 carbons, one or more aryl or alkaryl groups, or one or more alicyclic groups, optionally containing oxygen atoms, provided that the primary polyamine compounds have a total of from 2-18 carbon atoms.

40. The surface mount device of claim 39, wherein the polyamine compound comprises mono or polymethylene polyamines, mono or polyethylene polyamines, mono or polybutylene polyamines, mono or polypropylene polyamines, mono or pentylene polyamines, heptylene polyamines, trimethylenediamine, tetramethylenediamine,

pentamethylenediamine, hexamethylenediamine, 2,2,4-trimethylhexamethylenediamine, 2,4, 4-trimethylhexamethylenediamine, octamethylenediamine, ethylene diamine, 4,9-dioxadiamino-1,12-dodecane; triethylene tetramine, tris(2-aminoethyl)-amine, 1,2- and 1,3-propylene diamine, 1,2- and 1,4-butanediamine, 2-methyl-1,5-pentanediamine, decamethylene diamine, diethylene triamine, di(heptamethylene)triamine, tripropylene tetramine, tetraethylene pentamine, pentaethylene hexamine, and di(trimethylene)triamine, phenylenediamine, p- and m-xylylene diamine, methylene dianiline, 2,4-toluenediamine, 2,6-toluenediamine, 2,3-diaminonapthalene, polymethylene polyphenylpolyamine, 4,4'-diaminodiphenyl ether, isophoronediamine, diaminocyclohexane, piperazine, aminoalkyl-substituted piperazines, 1,3-bis(aminomethyl)cyclohexane, 4,4'diaminodicyclohexylmethane, or bis(4-amino-3-methylcyclohexyl)methane, or mixtures thereof.

41. The surface mount device of claim 39, wherein the amine functionalized polyolefin is prepared by reacting a polyamine compound onto an acid functionalized polyolefin.

42. The surface mount device of claim 1, wherein the thermoplastic adhesive comprises a polyamide polymer.

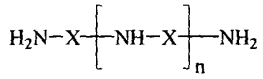
species

43. The surface mount device of claim 42, wherein the thermoplastic adhesive comprises a functionalized polyamide.

44. The surface mount device of claim 43, wherein the functionalized polyamide has a terminal functional group content ranging from 0.04 to 4 meq/g.

45. The surface mount device of claim 42, wherein the polyamide comprises the reaction product of polyamine monomers with polycarboxylic acid monomers at a ratio greater than 1.1:1.

46. The surface mount device of claim 42, wherein the polyamide comprises the reaction product of polyamine monomers with polycarboxylic acid monomers, wherein the polyamine monomers are represented by the formula:



wherein n is an average of integers within 0 and 10, inclusive, preferably within 0 and 4 inclusive; and X is a divalent branched or unbranched hydrocarbon radical having about 1-24 carbons, one or more aryl or alkaryl groups, or one or more alicyclic groups, optionally containing oxygen atoms, provided that the primary polyamine compounds have a total of from 2-18 carbon atoms.

47. The surface mount device of claim 46, wherein the polyamine compound comprises mono or polymethylene polyamines, mono or polyethylene polyamines, mono or polybutylene polyamines, mono or polypropylene polyamines, mono or pentylene polyamines, heptylene polyamines, trimethylenediamine, tetramethylenediamine, pentamethylenediamine, hexamethylenediamine, 2,2,4-trimethylhexamethylenediamine, 2,4, 4-trimethylhexamethylenediamine, octamethylenediamine, ethylene diamine, 4,9-dioxadiamino-1,12-dodecane;

triethylene tetramine, tris(2-aminoethyl)-amine, 1,2- and 1,3-propylene diamine, 1,2- and 1,4-butanediamine, 2-methyl-1,5-pentanediamine, decamethylene diamine, diethylene triamine, di(heptamethylene)triamine, tripropylene tetramine, tetraethylene pentamine, pentaethylene hexamine, and di(trimethylene)triamine, phenylenediamine, p- and m-xylylene diamine, methylene dianiline, 2,4-toluenediamine, 2,6-toluenediamine, 2,3-diaminonapthalene, polymethylene polyphenylpolyamine, 4,4'-diaminodiphenyl ether, isophoronediamine, diaminocyclohexane, piperazine, aminoalkyl-substituted piperazines, 1,3-bis(aminomethyl)cyclohexane, 4,4'diaminodicyclohexylmethane, or bis(4-amino-3-methylcyclohexyl)methane, or mixtures thereof.

48. The surface mount device of claim 42, wherein the polyamide has a complex viscosity ranging from 2000 cps to 12,000 cps at 190°C.

49. The surface mount device of claim 42, wherein the polyamide has a number average molecular weight Mn within a range of 500 and up to 8000.

50. The surface mount device of claim 42, wherein the polyamide has a number average molecular weight Mn within a range of 5000 to 100,000.

51. The surface mount device of claim 42, wherein the amount of polyamide used in the thermoplastic adhesive ranges from 2 to 95 wt.% based on the weight of the thermoplastic adhesive.

52. The surface mount device of claim 1, wherein the thermoplastic adhesive comprises

(A) from 5% to 98% by weight of a functionalized polyolefin, and

(B) from 2% to 95% by weight of a polyamide compound.

53. The surface mount device of claim 52, wherein the weight ratio of the functionalized polyolefin to the polyamide compound ranges from 98:2 to 40:60, respectively.

54. The surface mount device of claim 1, wherein the thermoplastic adhesive has a storage modulus of at least 100 Pa at temperatures of up to 125°C, as measured in a parallel plate rheometry test at a 1" circular plate gap width of 1mm, and a heat rate of 2°C per minute, and a shear rate of 0.1 radians per second.

55. The surface mount device of claim 54, wherein the thermoplastic adhesive has a storage modulus of at least 1000 Pa at temperatures up to 125°C.

56. The surface mount device of claim1, wherein the thermoplastic adhesive has a complex viscosity of at least 50 Pa•s at any temperature ranging from 140°C to 220°C, as measured in a parallel plate rheometry test at a 1" circular plate gap width of 1mm, and a heat rate of 2°C per minute starting at 140°C, and at a shear rate of 0.1 radians per second.

57. The surface mount device of claim 56, wherein the thermoplastic adhesive has a complex viscosity of at least 80 Pa•s at any temperature ranging from 140°C to 220°C.

58. The surface mount device of claim 57, wherein the thermoplastic adhesive has a complex viscosity of at

least 100 Pa s at any temperature ranging from 140°C to 220°C.

59. The surface mount device of claim 58, wherein the thermoplastic adhesive has a complex viscosity of at least 175 Pa•s at any temperature ranging from 140°C to 220°C.

60. The surface mount device of claim 56, wherein the thermoplastic adhesive has a complex viscosity which does not exceed 5000 at 220°C.

61. The surface mount device of claim 56, wherein the thermoplastic adhesive has a complex viscosity which does not exceed 2500 at 220°C.

62. The surface mount device of claim 1, wherein the thermoplastic adhesive has a tensile elongation of at least 50%.

63. The surface mount device of claim 1, wherein the thermoplastic adhesive has a tensile elongation of at least 100%.

64. The surface mount device of claim 1, wherein the thermoplastic adhesive has a tensile elongation of at least 150%.

65. The surface mount device of claim 1, wherein the thermoplastic adhesive has a Youngs modulus ranging from 5 MPa to 2000 MPa.

66. The surface mount device of claim 1, wherein the thermoplastic adhesive has a Youngs modulus ranging from 70 to 300 MPa.

67. The surface mount device of claim 1, wherein the thermoplastic adhesive has a maximum tensile strength of at least 500 to 15,000 psi.

68. The surface mount device of claim 1, wherein the thermoplastic adhesive has a maximum tensile strength ranging from 500 to 4000 psi.

69. The surface mount device of claim 1, wherein the thermoplastic adhesive has a complex viscosity of at least 80 Pa•s at any temperature ranging from 140°C to 220°C, and does not exceed 5000 Pa•s at 220°C, as measured in a parallel plate rheometry test at a 1" circular plate gap width of 1mm, and a heat rate of 2°C per minute starting at 140°C, and at a shear rate of 0.1 radians per second, a tensile elongation of at least 50%, a Youngs modulus of less than 2000 MPa at 25°C, and a tensile strength of at least 500 psi.

70. The surface mount device of claim 1, wherein the thermoplastic adhesive is non-electrically conducting.

71. An assembly comprising a printed circuit board, a surface mount electronic device comprising an organic connecting substrate, solder joints providing a connection between the substrate and the device and the board, and solid thermoplastic adhesive joints attached to the substrate and the board.

subcombination

72. The assembly of claim 71, wherein the assembly has an assembly gap width defined as the distance across the gap between the printed circuit board and the surface mounted electronic device after solder reflow, and the thermoplastic adhesive joints are defined by an x, x', and g dimension in a cross-section cut of the assembly having a view of the thermoplastic adhesive joints and the solder joints, the x dimension defined as the longest distance between the ends of the thermoplastic adhesive in contact with the interface between the device and the thermoplastic adhesive joint, the x' dimension defined as the longest distance between the ends of the thermoplastic adhesive in contact with the interface between the board and the thermoplastic adhesive joint, and the g dimension defined as the diameter of the thermoplastic adhesive measured at ½ the assembly gap distance, wherein at least one thermoplastic adhesive joint has dimensions satisfying each of the following relationships:

$$3x \geq g \geq .33x \text{ and } 3x' \geq g \geq .33x'$$

73. The assembly of claim 72, wherein the thermoplastic adhesive joint has dimensions satisfying each of the following relationships:

$$2x \geq g \geq 0.5x \text{ and } 2x' \geq g \geq 0.5x'$$

74. The assembly of claim 73, wherein the thermoplastic adhesive joint has dimensions satisfying each of the following relationships:

$$x \geq g \geq .3x \text{ and } x' \geq g \geq .3x'$$

75. The assembly of claim 74, wherein the thermoplastic adhesive joint satisfies each of the following relationships:

$$x/x' \geq 0.5 \text{ and } x'/x \geq 0.5$$

76. The assembly of claim 71, wherein the surface mounted electronic device is a leaded surface mounted electronic device.

77. The assembly of claim 76, wherein the surface mounted electronic device is a PBGA, μBGA, flip chip BGA, stacked die BGA, or flex tape BGA.

78. The assembly of claim 71, wherein the printed circuit board is flexible.

79. The assembly of claim 71, wherein the thermoplastic adhesive joints are electrically non-conducting.

80. The assembly of claim 71, wherein the thermoplastic adhesive joints are on each corner of the bottom surface of the surface mounted electronic device.

81. The assembly of claim 71, wherein the thermoplastic adhesive joints contacts at least two opposing edges of the surface mounted electronic device.

82. The assembly of claim 71, wherein the thermoplastic adhesive is attached to a portion of available surfaces on the bottom of the surface mounted electronic device.

83. The assembly of claim 71, wherein the thermoplastic adhesive joint has a complex viscosity of at least 80 Pa•s at any temperature ranging from 140°C to 220°C, as measured in a parallel plate rheometry test at a 1" circular plate gap width of 1mm, and a heat rate of 2°C per minute starting at 140°C, and at a shear rate of 0.1

radians per second, and wherein the thermoplastic adhesive is a solid or semi-solid at 100°C.

84. The assembly of claim 83, wherein the thermoplastic adhesive joint has a complex viscosity of at least 100 Pa•s at any temperature ranging from 140°C to 220°C.

85. The assembly of claim 84, wherein the thermoplastic adhesive joint has a complex viscosity which does not exceed 5000 Pa•s at 220°C.

86. The assembly of claim 71, wherein the thermoplastic adhesive joint has a tensile elongation of at least 150%.

87. The assembly of claim 71, wherein the thermoplastic adhesive joint has a Youngs modulus ranging from 70 to 300 MPa.

88. The assembly of claim 71, wherein the thermoplastic adhesive has a tensile strength of at least 500 psi.

89. The assembly of claim 71, wherein the thermoplastic adhesive comprises a functionalized polyolefin.

90. The assembly of claim 89, wherein the amount of the functionalized polyolefin is at least 20 wt.%, based on the weight of the thermoplastic adhesive.

91. The assembly of claim 89, wherein the functionalized polyolefin is functionalized with acid groups, amine groups, or a combination thereof.

92. The assembly of claim 90, wherein the functionalized polyolefin is functionalized with a functionalizing agent

comprising unsaturated mono- or polycarboxylic acid monomers or the acid derivatives thereof.

93. The assembly of claim 92, wherein the functionalizing agent comprises itaconic acid, acrylic acid, methacrylic acid, ethylacrylic acid, butylacrylic acid, maleic acid, the ester and anhydride derivatives thereof, or vinyl acetate.

94. The assembly of claim 89, wherein the functionalized polyolefin comprises an amine functionalized polyolefin.

95. The assembly of claim 71, wherein the thermoplastic adhesive joint comprises a polyamide polymer.

96. The assembly of claim 95, wherein the thermoplastic adhesive joint comprises a functionalized polyamide polymer.

97. The assembly of claim 95, wherein the polyamide has a complex viscosity ranging from 2000 cps to 12,000 cps at 190°C.

98. The assembly of claim 97, wherein the polyamide has a number average molecular weight Mn within a range of 500 and up to 100,000.

99. The assembly of claim 71, wherein the thermoplastic adhesive joint comprises:

(A) from 5% to 98% by weight of a functionalized polyolefin, and

(B) from 2% to 95% by weight of a polyamide compound.

100. The assembly of claim 99, wherein the weight ratio of the functionalized polyolefin to the polyamide compound ranges from 98:2 to 40:60, respectively.

101. The assembly of claim 71, wherein the surface mounted electronic device remains bonded to the printed circuit board when deflected around a 0.75" mandrel.

102. The assembly of claim 71, wherein 50% of the surface mounted electronic devices exhibit a circuit failure at 30 or more drops, as measured in a gravity drop test wherein an assembly weighted for its intended application is dropped on the face of the assembly opposing the surface mounted electronic device in a free fall from a height of 2 meters onto a concrete pad.

103. A process for adhering an organic surface of a surface mount electronic device to a printed circuit board, comprising forming an assembly comprised of a printed circuit board, a surface mounted electronic device having a bottom surface, and a solid or semi-solid thermoplastic adhesive disposed between the printed circuit board and the surface mounted electronic device, and heating the thermoplastic adhesive to a temperature sufficient to provide an adhesive joint between the organic surface and the board.

104. The process of claim 103, wherein the thermoplastic adhesive is heated to a temperature sufficient to melt the thermoplastic adhesive.

105. The process of claim 103, wherein the thermoplastic adhesive is heated and melted at a temperature within the range of 180°C and 260°C.

106. The process of claim 103, wherein the assembly comprises a solid or semi-solid thermoplastic adhesive attached to the bottom surface of the connecting substrate prior to said heating.

107. The process of claim 106, wherein the assembly comprises solder bumps contacting landing pads on the printed circuit board, and the heating is conducted under solder reflow conditions, and the thermoplastic adhesive melts without impinging on the solder balls.

108. The process of claim 103, wherein the surface mounted electronic device remains bonded to the printed circuit board when deflected around a 0.75" mandrel.

109. The process of claim 103,wherein 50% of the surface mounted electronic devices exhibit a circuit failure at 30 or more drops, as measured in a gravity drop test wherein an assembly weighted for its intended application is dropped on the face of the assembly opposing the surface mounted electronic device in a free fall from a height of 2 meters onto a concrete pad.

110. A process for adhering a printed circuit board having landing pads and a surface mount electronic device comprising an organic connecting substrate having an upper surface and a bottom surface, and solder bumps disposed on a bottom surface or having terminal leads disposed on the connecting substrate, comprising:

a) attaching a thermoplastic adhesive onto a portion of the bottom surface of the connecting substrate;

b) mounting the electronic device onto a printed circuit board to form an assembly in which the terminal leads or solder bumps are aligned with corresponding landing pads on the printed circuit board and the adhesive faces the printed circuit board; and

c) heating the assembly under solder reflow conditions effective to provide an adhesive bond between the organic bottom surface of the electronic device and the printed circuit board and effective to provide a solder joint between the connecting substrate and the landing pads on the printed circuit board.

111. The process of claim 110, wherein the surface mounted electronic device is a ball grid array.

112. A process for adhering a printed circuit board comprising landing pads to a surface mount electronic device comprising a connecting substrate having a bottom surface with leads, said process comprising adhering a thermoplastic adhesive onto a portion of said bottom surface, mounting the electronic device onto a printed circuit board to form an assembly in which the leads on said bottom surface are aligned with corresponding landing pads and the thermoplastic adhesive faces the printed circuit board, followed by heating the assembly under solder reflow conditions effective to provide an adhesive joint between said bottom surface and the

printed circuit board, wherein the thermoplastic adhesive comprises a functionalized polyolefin.

113. The process of claim 112, wherein the amount of the functionalized polyolefin in the thermoplastic adhesive is at least 3% by weight.

114. The process of claim 113, wherein the amount of the functionalized polyolefin is at least 20 wt.%, based on the weight of the thermoplastic adhesive.

115. The process of claim 112, wherein the functionalized polyolefin is functionalized with acid groups, amine groups, or a combination thereof.

116. The process of claim 112, wherein the polyolefin is functionalized with an unsaturated mono- or polycarboxylic acid monomers or derivatives thereof, in an amount ranging from 0.05 wt.% to 50%, based on the weight of the functionalized polyolefin.

117. A process for adhering a printed circuit board comprising landing pads to a surface mount electronic device comprising a connecting substrate having a bottom surface with leads, said process comprising adhering a thermoplastic adhesive onto a portion of said bottom surface, mounting the electronic device onto a printed circuit board to form an assembly in which the leads on said bottom surface are aligned with corresponding landing pads and the thermoplastic adhesive faces the printed circuit board, followed by heating the assembly under solder reflow conditions effective to provide an adhesive joint between said bottom surface and the printed circuit board, wherein the thermoplastic adhesive

comprises a polyamide resin in an amount of at least 10 wt.%.

118. A process for adhering a printed circuit board comprising landing pads to a surface mount electronic device comprising a connecting substrate having a bottom surface with leads, said process comprising adhering a thermoplastic adhesive onto a portion of said bottom surface, mounting the electronic device onto a printed circuit board to form an assembly in which the leads on said bottom surface are aligned with corresponding landing pads and the thermoplastic adhesive faces the printed circuit board, followed by heating the assembly under solder reflow conditions effective to provide an adhesive joint between said bottom surface and the printed circuit board, wherein the thermoplastic adhesive comprises:

(A) from 5% to 98% by weight of a functionalized polyolefin, and

(B) from 2% to 95% by weight of a polyamide compound.

119. The process of claim 118, wherein the polyamide comprises a functional terminated polyamide compound comprising an acid or an amine functionality and having a terminal functional group content of at least 0.04 to 4 meq/g.

120. The process of claim 118, wherein the polyamide compound and functionalized polyolefin are substantially un-reacted with each other at solder reflow conditions.

121. A thermoplastic adhesive composition comprising a blend of:

(A) from 5% to 98% by weight of a functionalized polyolefin, and

(B) from 2% to 95% by weight of a polyamide compound.

123. The adhesive of claim 121, wherein the amount of the functionalized polyolefin is at least 20 wt.%, based on the weight of the thermoplastic adhesive.

124. The adhesive of claim 123, wherein the amount of the functionalized polyolefin is at least 40 wt.%, based on the weight of the thermoplastic adhesive.

125. The adhesive of claim 121, wherein the functionalized polyolefin is functionalized with acid groups, amine groups, or a combination thereof.

126. The adhesive of claim 125, wherein the functionalized polyolefin is functionalized with a functionalizing agent comprising unsaturated mono- or polycarboxylic acid monomers or the acid derivatives thereof.

127. The adhesive of claim of claim 125, wherein the functionalizing agent comprises acrylic acid, methacrylic acid, ethylacrylic acid, butylacrylic acid, maleic acid, fumaric acid, tetrahydrophthalic acid, 4-methylcyclohexane-4-en-1,2-dicarboxylic acid, bicyclo(2,2,1)hepta-5-en-2,3-dicarboxylic acid, itaconic acid, crotonic acid, citraconic acid, isocrotonic acid, mesaconic acid, angelic acid, maleic anhydride, crotonic anhydride, citraconic anhydride, itaconic anhydride,

nadic anhydride, nadic methyl anhydride, tetrahydro phthalic anhydride, vinyl acetate, methyl hydrogen maleate, methyl acrylate, methyl methacrylate, ethyl acrylate, ethyl methacrylate, butyl acrylate, butyl methacrylate, glycidyl acrylate, glycidyl methacrylate, monoethyl maleate, diethyl maleate, monomethyl fumarate, dimethyl fumarate, monoethyl itaconate, diethyl itaconate, acrylamide, methacrylamide, maleic monoamide, maleic diamide, maleic N-monoethylamide, maleic N,N-diethylamide, maleic N-monobutylamide, maleic N,N-dibutylamide, fumaric amide, fumaric diamide, fumaric N-monoethylamide, fumaric N,N-diethylamide, fumaric N-monobutylamide, fumaric N,N-dibutylamide, maleimide, N-butylmaleimide, N-phenylmaleimide, sodium acrylate, mono and di-sodium maleate, sodium methacrylate, potassium acrylate, or potassium methacrylate, or combinations thereof.

128. The adhesive of claim 127, wherein the functionalizing agent comprises itaconic acid, acrylic acid, methacrylic acid, ethylacrylic acid, butylacrylic acid, maleic acid, the ester and anhydride derivatives thereof, or vinyl acetate.

129. The adhesive of claim 128, wherein the functionalizing agent comprises methacrylic acid, acrylic acid, maleic acid, or maleic anhydride.

130. The adhesive of claim 126, wherein the amount of functionalizing agent ranges from 0.05 wt.% to 50 wt.%, based on the weight of the functionalized polyolefin.

131. The adhesive of claim 125, wherein the functionalized polyolefin comprises a random copolymer of ethylene and an unsaturated carboxylic acid or derivative thereof.

132. The adhesive of claim 131, wherein the acid or derivative thereof comprises methacrylic acid, acrylic acid, maleic acid, maleic anhydride or combinations thereof.

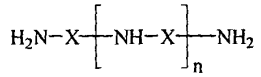
133. The adhesive of claim 131, wherein the functionalized polyolefin has a density ranging from 0.915 to 0.935 g/cc.

134. The adhesive of claim 121, wherein the functionalized polyolefin is a copolymer or grafted polymer of one or more alpha olefin monomers having 2-10 carbon atoms and mono- or polyunsaturated carboxylic acids or the derivatives thereof, and optionally carbon monoxide monomer.

135. The adhesive of claim 121, wherein the functionalized polyolefin comprises an amine functionalized polyolefin..

136. The adhesive of claim 135, wherein the amine functionalized polyolefin is prepared by reacting an acid functionalized polyolefin with a polyamine compound or by copolymerizing or reacting a polyamine compound with a polyolefin.

137. The adhesive of claim 136, wherein the polyamine compound is represented by the formula:



wherein n is an average of integers within 0 and 10, inclusive, preferably within 0 and 4 inclusive; and X is a divalent branched or unbranched hydrocarbon radical having about 1-24 carbons, one or more aryl or alkaryl groups, or one or more alicyclic groups, optionally containing oxygen atoms, provided that the primary polyamine compounds have a total of from 2-18 carbon atoms.

138. The adhesive of claim 137, wherein the polyamine compound comprises mono or polymethylene polyamines, mono or polyethylene polyamines, mono or polybutylene polyamines, mono or polypropylene polyamines, mono or pentylene polyamines, heptylene polyamines, trimethylenediamine, tetramethylenediamine, pentamethylenediamine, hexamethylenediamine, 2,2,4-trimethylhexamethylenediamine, 2,4, 4-trimethylhexamethylenediamine, octamethylenediamine, ethylene diamine, 4,9-dioxadiamino-1,12-dodecane; triethylene tetramine, tris(2-aminoethyl)-amine, 1,2- and 1,3-propylene diamine, 1,2- and 1,4-butanediamine, 2-methyl-1,5-pentanediamine, decamethylene diamine, diethylene triamine, di(heptamethylene)triamine, tripropylene tetramine, tetraethylene pentamine, pentaethylene hexamine, and di(trimethylene)triamine, phenylenediamine, p- and m-xylylene diamine, methylene dianiline, 2,4-toluenediamine, 2,6-toluenediamine, 2,3-diaminonapthalene, polymethylene polyphenylpolyamine, 4,4'-diaminodiphenyl ether, isophoronediamine, diaminocyclohexane, piperazine, aminoalkyl-substituted piperazines, 1,3-bis(aminomethyl)cyclohexane,

4,4'diaminodicyclohexylmethane, or bis(4-amino-3-methylcyclohexyl)methane, or mixtures thereof.

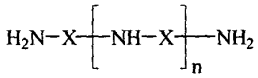
139. The adhesive of claim 136, wherein the amine functionalized polyolefin is prepared by reacting a polyamine compound onto an acid functionalized polyolefin.

140. The adhesive of claim 121, wherein the thermoplastic adhesive comprises a functionalized polyamide.

141. The adhesive of claim 140, wherein the functionalized polyamide has a terminal functional group content ranging from 0.04 to 4 meq/g.

142. The adhesive of claim 121, wherein the polyamide comprises the reaction product of polyamine monomers with polycarboxylic acid monomers at a ratio greater than 1.1:1.

143. The adhesive of claim 121, wherein the polyamide comprises the reaction product of polyamine monomers with polycarboxylic acid monomers, wherein the polyamine monomers are represented by the formula:



wherein n is an average of integers within 0 and 10, inclusive, preferably within 0 and 4 inclusive; and X is a divalent branched or unbranched hydrocarbon radical having about 1-24 carbons, one or more aryl or alkaryl groups, or

one or more alicyclic groups, optionally containing oxygen atoms, provided that the primary polyamine compounds have a total of from 2-18 carbon atoms.

144. The adhesive of claim 143, wherein the polyamine compound comprises mono or polymethylene polyamines, mono or polyethylene polyamines, mono or polybutylene polyamines, mono or polypropylene polyamines, mono or pentylene polyamines, heptylene polyamines, trimethylenediamine, tetramethylenediamine, pentamethylenediamine, hexamethylenediamine, 2,2,4-trimethylhexamethylenediamine, 2,4, 4-trimethylhexamethylenediamine, octamethylenediamine, ethylene diamine, 4,9-dioxadiamino-1,12-dodecane; triethylene tetramine, tris(2-aminoethyl)-amine, 1,2- and 1,3-propylene diamine, 1,2- and 1,4-butanediamine, 2-methyl-1,5-pentanediamine, decamethylene diamine, diethylene triamine, di(heptamethylene)triamine, tripropylene tetramine, tetraethylene pentamine, pentaethylene hexamine, and di(trimethylene)triamine, phenylenediamine, p- and m-xylylene diamine, methylene dianiline, 2,4-toluenediamine, 2,6-toluenediamine, 2,3-diaminonapthalene, polymethylene polyphenylpolyamine, 4,4'-diaminodiphenyl ether, isophoronediamine, diaminocyclohexane, piperazine, aminoalkyl-substituted piperazines, 1,3-bis(aminomethyl)cyclohexane, 4,4'diaminodicyclohexylmethane, or bis(4-amino-3-methylcyclohexyl)methane, or mixtures thereof.

145. The adhesive of claim 121, wherein the polyamide has a complex viscosity ranging from 2000 cps to 12,000 cps at 190°C.

146. The adhesive of claim 121, wherein the polyamide has a number average molecular weight Mn within a range of 500 and up to 8000.

147. The adhesive of claim 121, wherein the polyamide has a number average molecular weight Mn within a range of 5000 to 100,000.

148. The adhesive of claim 121, wherein the weight ratio of the functionalized polyolefin to the polyamide compound ranges from 98:2 to 40:60, respectively.

149. The adhesive of claim 121, wherein the thermoplastic adhesive has a storage modulus of at least 100 Pa at temperatures of up to 125°C, as measured in a parallel plate rheometry test at a 1" circular plate gap width of 1mm, and a heat rate of 2°C per minute, and a shear rate of 0.1 radians per second..

150. The adhesive of claim 149, wherein the thermoplastic adhesive has a storage modulus of at least 1000 Pa at temperatures up to 125°C.

151. The adhesive of claim 121, wherein the thermoplastic adhesive has a complex viscosity of at least 50 Pa•s at any temperature ranging from 140°C to 220°C, as measured in a parallel plate rheometry test at a 1" circular plate gap width of 1mm, and a heat rate of 2°C per minute starting at 140°C, and at a shear rate of 0.1 radians per second.

152. The adhesive of claim 151, wherein the thermoplastic adhesive has a complex viscosity of at least 80 Pa•s at any temperature ranging from 140°C to 220°C.

153. The adhesive of claim 152, wherein the thermoplastic adhesive has a complex viscosity of at least 100 Pa•s at any temperature ranging from 140°C to 220°C.

154. The adhesive of claim 153, wherein the thermoplastic adhesive has a complex viscosity of at least 175 Pa•s at any temperature ranging from 140°C to 220°C.

155. The adhesive of claim 121, wherein the thermoplastic adhesive has a complex viscosity which does not exceed 5000 Pa•s at 220°C.

156. The adhesive of claim 155, wherein the thermoplastic adhesive has a complex viscosity which does not exceed 2500 Pa•s 220°C.

157. The adhesive of claim 121, wherein the thermoplastic adhesive has a tensile elongation of at least 50%.

158. The adhesive of claim 121, wherein the thermoplastic adhesive has a tensile elongation of at least 100%.

159. The adhesive of claim 121, wherein the thermoplastic adhesive has a tensile elongation of at least 150%.

160. The adhesive of claim 121, wherein the thermoplastic adhesive has a Youngs modulus ranging from 5 MPa to 2000 MPa.

161. The adhesive of claim 121, wherein the thermoplastic adhesive has a Youngs modulus ranging from 70 to 300 MPa.

162. The adhesive of claim 121, wherein the thermoplastic adhesive has a tensile strength of at least 500 psi to 15,000 psi.

163. The adhesive of claim 121, wherein the thermoplastic adhesive has a tensile strength ranging from 500 psi to 4000 psi.

164. The adhesive of claim 121, wherein the thermoplastic adhesive has a complex viscosity of at least 80 Pa•s at any temperature ranging from 140°C to 220°C, and does not exceed 5000 Pa•s at 220°C, as measured in a parallel plate rheometry test at a 1" circular plate gap width of 1mm, and a heat rate of 2°C per minute starting at 140°C, and at a shear rate of 0.1 radians per second, a tensile elongation of at least 50%, a Youngs modulus of no more than 2000 MPa at 25°C, and a tensile strength of at least 500 psi.